A Randomized Study of Closure of the Peritoneum at Cesarean Delivery

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This study was conducted to test the hypothesis that non-closure of the visceral and parietal peritoneum during low transverse cervical cesarean delivery is not associated with increased intraoperative or immediate postoperative complications. One hundred thirteen patients scheduled for low transverse cervical cesarean were randomized to either closure of both the visceral and parietal peritoneum with absorbable suture ($N = 59$) or no peritoneal closure ($N = 54$). Patients were cared for in the usual postoperative manner without reference to treatment group. There were no demographic differences between the groups and no differences in method(s) of anesthesia, operative indication(s), or use of peripartum epidural narcotics. The incidence of fever, endometritis, or wound infection was similar between groups. There were no differences in the number of patients requiring parenteral narcotic analgesia or in the number of doses per patient. The number of oral analgesic doses was significantly greater with closure than without ($P = .014$). The frequency with which postoperative ileus was diagnosed in each group was similar, and there was no difference regarding the day on which patients were advanced to liquid or select diets. Bowel stimulants were administered more frequently to the closure than to non-closure patients ($P = .03$). The average operating time was shorter for the open group than for the closure group ($P < .005$). We conclude that non-closure of the visceral and parietal peritoneum at low transverse cervical cesarean delivery appears to have no adverse effect on immediate postoperative recovery, may decrease postoperative narcotic requirements, allows less complicated return of bowel function, and provides a simplified and shorter surgical procedure. ***(Obstet Gynecol 77:818, 1991)***

Cesarean delivery is the most common intraperitoneal surgical procedure performed in the United States.[1] The description by Kerr[2] of the transperitoneal low transverse cervical incision includes active closure of the visceral peritoneum across the uterine incision. In addition to the visceral peritoneum, the parietal peritoneum has traditionally also been closed in a separate layer from the remainder of the abdominal-wall closure.[3] This closure of the peritoneum has persisted in obstetrics despite published reports, primarily in the general surgery literature, indicating that reapproximation is not only unnecessary for wound healing and wound strength but may actually delay healing and promote adhesion formation.[4–10] We conducted this study to test the hypothesis that non-closure of the visceral and parietal peritoneum at low transverse cervical cesarean is not associated with increased intraoperative or immediate postoperative complications.

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Materials and Methods

Between June and September 1988, 117 women who were to undergo cesarean delivery were randomized to one of two categories. Group assignment was based on the last digit of the patient's medical record. The control group consisted of women undergoing low transverse cervical cesarean with active closure of both the visceral and parietal peritoneum using a delayed absorbable suture and a continuous running technique. The non-closure (study) group consisted of patients undergoing the same procedure but without reapproximation of either peritoneal membrane. Four subjects were disqualified because they received vertical hysterotomies on the basis of intraoperative findings. Fifty-nine women were randomized to the control group and 54 to the study group.

In both groups, the fascia was closed as a separate layer using delayed absorbable suture and the skin incision was reapproximated using staples. The operations were performed by a variety of resident and faculty physicians in the Department of Obstetrics and Gynecology of the University of Utah.

The patients were managed in the usual postoperative manner. The nursing staff was not aware of the patient's treatment group. All medications were administered on an as-needed basis. Postoperative management decisions were made without reference to

Table 1. Patient Demographics, Anesthesia Type, and Epidural Narcotic Rate

	Control group (N = 59)	Study group (N = 54)	Significance
Age	26.8 ± 6.1	25.4 ± 5.2	NS
Range	15–38	15–37	
Parity	2.4 ± 1.3	2.6 ± 2.2	NS
Range	1–6	1–14	
Gestational age	36.7 ± 3.5	36.7 ± 4.2	NS
Range	26–41	26–42	
Primary cesarean	38 (64%)	35 (64.8%)	NS
Anesthesia			
Epidural	45 (76.2%)	42 (77.8%)	NS
General	11 (18.6%)	9 (16.7%)	NS
Spinal	3 (5.1%)	3 (5.6%)	NS
Epidural narcotics	25 (42.3%)	24 (44.4%)	NS

NS = not significant.

treatment group. Some subjects in each group were treated with a single dose of epidural morphine sulfate (3–5 mg) perioperatively by the anesthesiologist assigned to the case. This decision was independent of treatment group.

Following the study period, we reviewed the hospital records for patient demographics, duration of surgery, and postoperative complications, including fever (temperature of 38C or greater at least once during the postoperative hospitalization), endometritis, antibiotic usage, ileus or partial ileus, and wound problems. Diet advancement and length of hospital stay were also evaluated. Bowel stimulants were used in any woman who complained of postoperative gas pains or constipation without evidence of bowel obstruction. Postoperative narcotic usage was quantified by the number of administered doses of parenteral meperidine or morphine and oral oxycodone or codeine.

This study was conducted under a protocol approved by the Human Subjects Study Institutional Review Board of the University of Utah School of Medicine. Statistical analysis was performed using Student t test for continuous variables and χ^2 analysis for discrete variables. Statistical significance was defined as $P < .05$.

Results

Table 1 presents the patient demographic and anesthesia data; we found no significant differences between the groups. Potential sources of antepartum and peripartum bias appear in Table 2; again, there were no significant differences between the groups.

Table 3 outlines the febrile and infectious morbidity as recorded in the hospital records. There were no significant differences between the groups. Five of the six study subjects with endometritis were discharged on the fourth postoperative day. No patients in either group had pelvic abscess, septic pelvic thrombophlebitis, or peritonitis and none required reoperation or other invasive procedures.

Table 2. Antepartum and Peripartum Factors

	Control group (N = 59)	Study group (N = 54)	Significance
Tubal ligation	10 (16.9%)	5 (9.3%)	NS
Severe preeclampsia	3 (5.1%)	5 (9.3%)	NS
Intravenous magnesium sulfate	7 (11.9%)	6 (11.1%)	NS
Chorioamnionitis	1 (1.7%)	5 (9.3%)	NS

NS = not significant.

There was no significant difference between the groups in the number of doses of postoperative parenteral narcotics per subject (control group 4.6 ± 2.7, study group 5.9 ± 4.1). The controls did require significantly more oral narcotics (control group 11.1 ± 6.3, study group 8.6 ± 4.9; $P = .014$). This significant difference persisted when women undergoing concurrent sterilization procedures were excluded (control [N = 49] 10.5 ± 6.4, study [N = 49] 8.0 ± 5.4; $P = .034$). Fourteen controls and 15 study subjects required no parenteral narcotic analgesia and all had previously received intraoperative epidural narcotics.

The clinical diagnosis of ileus or partial ileus was similar in both groups (control group three of 59 or 5.1%, study group two of 54 or 3.7%). There was no difference between groups in regard to the day on which the patients were advanced to liquid or select diets. However, there was a significant difference in the use of bowel stimulants; 17 controls (28.8%) required suppositories or enemas, in contrast to eight in the study group (14.8%) ($P = .03$).

The mean operative time in the control group was 57.9 ± 13.9 minutes (range 30–113), versus 50.0 ± 13.5 minutes (range 26–100) in the study group ($P < .005$).

Table 3. Postoperative Febrile and Infectious Morbidity and Antibiotic Usage

	Control group (N = 59)	Study group (N = 54)	Significance
Fever	8 (13.5%)	9 (16.6%)	NS
Endometritis	3 (5.1%)	6 (11.1%)	NS
Wound infection	5 (8.5%)	3 (5.6%)	NS
Therapeutic antibiotic administration	6 (10.2%)	9 (16.6%)	NS

NS = not significant.

Anesthesia and operating room charges for individual subjects were not recorded.

Although not statistically significant, controls had slightly longer postoperative hospitalizations (control group 4.25 ± 0.98 days, range 3–7; study group 4.02 ± 0.79 days, range 3–7). However, a significantly greater proportion of study subjects were discharged by the fourth hospital day (study 46 of 54 or 85.2%, control 43 of 59 or 72.8%; $P = .05$).

Discussion

When left undisturbed, peritoneal defects demonstrate mesothelial integrity (reperitonealization) by 48 hours and complete indistinguishable healing (ie, no scarring) by 5 days.[4–6] Reapproximation of peritoneal edges or repair of defects via grafts, even with suture material considered to be minimally reactive, results in increased tissue ischemia and necrosis and foreign-body tissue reactions, and may lead to increased adhesion formation at the sites of reperitonealization.[6–7,9,11] Only recently have these principles been recognized and discussed in the obstetric and gynecologic literature.[5,12–14]

In this sample of abdominal deliveries, there were no significant increases in febrile morbidity, endometritis, antibiotic usage, length of hospital stay, or return of bowel function when the peritoneum was left unsutured. On the contrary, the non-closure subjects had less oral pain medication requirements, less troublesome bowel function, and no extra hospital days. Although the controls required more bowel stimulants, this may merely reflect the increased oral narcotic requirements rather than any intrinsic postoperative bowel dysfunction.

Although the number of subjects experiencing endometritis in the study group was larger, the difference did not achieve statistical significance. All but one of the six women were discharged on the fourth postoperative day, and the remaining patient was released on the fifth postoperative day. In addition, all five study subjects with chorioamnionitis were also discharged by the fourth postoperative day, suggesting that non-closure of the peritoneum did not prolong or prevent the treatment of these infections.

The decrease in operative time associated with non-closure of the peritoneum was also associated with less anesthesia time and less time that the wound was exposed to environmental contaminants. Although not specifically addressed by this study, potential economic benefits include decreased anesthesia and operating room costs, personnel time and expense, and suture costs.

Adhesions are caused by ischemia, inflammation, and infection rather than by open surfaces. Omental and bowel adhesions to the hysterotomy site are rare in the low transverse cervical procedure as compared with classical cesarean. Adhesions at peritoneal closure sites following gynecologic surgery have been associated with subsequent small-bowel obstruction.[12] A recent study[14] confirmed that non-closure of the parietal peritoneum after gynecologic surgery did not increase adhesion formation found at second-look laparoscopy. Certainly if the bladder flap is less adherent to the lower uterine segment and fewer adhesions are formed, bladder discomfort may be decreased and subsequent pelvic surgery may be simplified.

We believe that our data support the following conclusions regarding non-closure of the visceral and parietal peritoneum at the time of cesarean: 1) It appears to have no detrimental effect in the immediate postoperative recovery period; 2) it may decrease postoperative narcotic requirements; 3) it is associated with less complicated return of bowel function; and 4) it provides a simplified surgical technique requiring less operative time.

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